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THE JOURNAL OF PHILOSOPHY

SCIENTIFIC OBJECTS AND EMPIRICAL THINGS

I

MODERN science began when observation and experimentation were acknowledged as having authoritative control over scientific ideas and conceptions. Newton's "Hypotheses non fingo" expresses this new orientation with respect to the seat of authority in science. Apart from its general significance, this statement of Newton's has an immediate, historical reference to the work of Descartes. The objects of Cartesian physics are constructs or products of thought, that is, in Newton's phraseology, "hypotheses"; in contrast, the objects which figure in Newton's system of natural science have their warrant in sensible experience, that is, are "experimentally" derived. But in seeking to emphasize the differences between the experimental method he pursued and the rationalistic method of Descartes, Newton obscured from his vision and the vision of others—notably Locke—the points wherein their methods and the objects of their science are similar. It is easy enough for us to see now that Newton's declaration, no matter how liberally interpreted, is rather exaggerated. His atoms or corpuscles, the ultimate constituent elements of the physical universe, do contain hypothetical or speculative characters; for all their warrant in sensible experience, the atoms are, in part, rationalistic constructs or products of thought for which no justification can be found in sensible experience; as much so as the objects of Cartesian physics. The hypothetical or speculative characters of Newton's scientific objects, though restricted in number, are by no means of negligible importance for the mathematical development of his system.

It is clear from Newton's further dictum that hypotheses have no place in experimental science, that to his mind the use of hypotheses is incompatible with the use of experiment, and that every scientist is therefore faced with the problem of choosing between them. His statement on this point is explicit and categorical. "Hypotheses, whether metaphysical or physical, whether of occult qualities or mechanical, have no place in experimental philosophy." The rule is simple and clear-cut. It is not a matter of determining to what degree hypothetical or speculative characters may be attributed to scientific objects otherwise experimentally derived; nor of determining which class of hypothetical characters may legiti-

mately in an experimental philosophy be attributed to its objects, and which not: hypothetical "mechanical and physical qualities" are excluded as definitively as "metaphysical and occult qualities." The rule is of the all or none variety. We must believe therefore that had Newton realized that he had given his scientific objects some hypothetical qualities, he would have felt constrained either to eliminate them from his system or else to disavow his adherence to "experimental philosophy." "Hypotheses non fingo" has consequently the important added significance of being an assertion of the *choice* Newton considered he had made.

Our knowledge of the requirements of experimental method in science is further advanced than it was in Newton's day. To attribute hypothetical "mechanical and physical" qualities to scientific objects is universally recognized to be consistent with employment of the experimental method. "Hypotheses," in the restricted Newtonian sense in which we have been using the term, have achieved an established place and function in scientific inquiry, and they have achieved this place and function without lessening the ultimate authority of observation and experimentation. Recognition of the hypothetical character of scientific objects does not today create the issue it created for Newton. No contemporary scientist is ever faced with the problem of having to decide whether he will admit hypotheses into his system or whether he will rely on observation and experimentation for his results. The two are no longer considered incompatible; they are recognized as complementary phases of the process of scientific investigation.

It would be historically untrue to say that Newton's failure to appreciate the true nature of his atoms or corpuscles was primarily responsible for generating the whole constellation of problems concerning the relation of scientific objects to empirical things which has occupied the central position in modern philosophical thought and discussion. Newton's failure to understand was itself the effect of deep-lying causes. To reach the roots we must go back and examine, as Dewey has repeatedly urged, the traditional theory of knowledge which Newton and those who made philosophical capital out of his work, inherited and accepted uncritically. This vein of inquiry is one that Dewey has extensively worked. The value and wisdom of attacking the primary roots of a problem can not be questioned. The benefits accruing from treatment of causes, not symptoms, are indisputable. Nevertheless, with respect to the problem at issue, the consequences of this mode of attack have not been of the sort one would, on general principles, expect. The reason for this is not far to seek. The atmosphere of modern philosophy is heavy with epistemologies. It is almost inevitable

that a criticism of a theory of knowledge should be interpreted in terms of its controversial setting instead of in terms of the original problem with which it deals. One example of such vitiation of meaning will suffice for our present purposes. One of the fundamental conclusions of Dewey's criticism is that the epistemological problem of modern philosophy is factitious. The real problem of knowledge is the problem of acquiring and developing means and methods of securing more accurate and more stable knowledge; that is, it is an indefinite series of specific problems involved in specific situations, not a general problem concerning the possibility of knowledge. Using the term "knowledge" in its broadest possible sense, the problem of knowledge is the problem of creating and improving the techniques and methods of inquiry. This problem is not factitious, but the real, original, ever-present, and ever-recurring problem human beings are faced with. Elementary consistency would require that Dewey's own constructive analysis of the knowledge-relation must not be interpreted as dealing with the problem of knowledge as that is treated in modern epistemology, but must be interpreted as concerned with the problem of knowledge as he has defined it. And yet the opposite evaluation of Dewey's constructive work is one that is prevalently made. That Dewey is engaged in trying to cure the modern epistemological disease by advancing a new and rival epistemology of the same general type he has declared factitious is a confusion one meets with on every hand.

Although discussion of the relation of scientific objects to empirical things can not avoid dealing with the theory of knowledge which underlies the problem, it will be more advantageous, for reasons just given, to approach this fundamental aspect indirectly rather than directly. The indirect approach can profitably take as its point of departure Newton's avowal that he neither invented nor used hypotheses, with its implication that the atoms or corpuscles are real.

II

The primary intention of Newton's assertion that his atoms are real, was undoubtedly to justify their inclusion in an "experimental philosophy." It was of the first importance for an "experimental philosophy" to prevent the institution of any breach between scientific objects and empirical things. For such a breach would serve to make suspect, if not actually to disqualify, the scientific objects. Scientific objects, not experience or empirical things, were then on the defensive.

The atoms or corpuscles are real, according to Newton, because

their constituent or inherent qualities—mass, motion, inertia, shape, impenetrability—are all qualities empirical bodies are sensibly experienced to have. The fact that the atoms or corpuscles are not, in their proper persons so to speak, directly perceptible, is an unavoidable, unfortunate consequence of the limits of acuity of human sense-organs. Large physical bodies can be broken up into smaller physical bodies. These smaller physical bodies are sensibly perceived to have the qualities of mass, motion, inertia, shape, impenetrability, possessed by the large, original body. No matter how often we repeat this process of physical analysis, finally reaching the smallest actually perceptible body, we obtain the same result. Physical analysis involves no qualitative change, only a quantitative change with respect to the qualities enumerated. It is inconceivable that the physical division of a given physical body should proceed *ad infinitum*. At some point the process must come to a stop. When that point is reached, we have the atom or corpuscle.

An implication of the atom being indivisible, is that it is permanent or eternal. An indivisible unit of matter is, obviously, a unit that can not be in any way internally affected by the action of another body, of whatever sort, unitary or complex, upon it. Annihilation is the only "internal" change that an indivisible element or unit can undergo. Such annihilation, furthermore, must, if it occurs, be instantaneous; it can not be progressive. Progress towards extinction would involve progressive changes in the "internal" nature of the atom—a type of change incompatible with its unitary character. To conceive of the possible fragmentation or annihilation of the atoms or corpuscles, we must conceive of a force, completely outside of Nature, e.g., God, capable of arbitrarily and instantaneously terminating their careers. Such a force, being outside Nature, no matter how possibly real it may be, has no place in Natural Philosophy and need not be considered. For a philosophy of Nature, the indivisibility of the atoms or corpuscles establishes their eternal or permanent character.

These three properties of the atoms, the properties of being imperceptible, indivisible, and permanent, mark them off from empirical things. They are properties arrived at by processes of reasoning, are inferred, not experienced properties. These properties do not, however, qualify the *what* of the atoms or corpuscles. The imperceptibility of the atoms is discounted immediately because their qualities are such that, given the requisite acuity of sense-perception, they could be perceived. Their indivisibility and permanence do not qualify their content, but confer upon them, so to speak, an "axiomatic" character. The "axiomatic" character of a proposition does not add to the actual content of meaning of the

proposition; it qualifies its functional relation to other propositions in the sense that it ensures that any proposition that is "axiomatic" will always have the same meaning and form no matter what complex of propositions, what "theorem" it enters into. It is not difficult to appreciate why the qualities atoms or corpuscles are assumed to have in common with experienced things should have been emphasized and those properties that distinguish them from empirical things should have been taken for granted, as in no way challenging or undermining their reality. That all thought or rationality presupposes and rests upon "axioms" was, in Newton's time, itself held to be axiomatic. What more natural, therefore, what more matter-of-course, than that Nature also should require and have her own set of "axioms"?

III

It is clear when we consider in relation to each other the two classes of properties attributed by Newton to his elements, that the reality of those properties (indivisibility and permanence) which distinguish the atoms or corpuscles from empirical things, is sustained by the reality of those qualities they have in common with empirical things, and not the other way about. Scientific objects, *qua* scientific objects, have no power to confer reality upon themselves or any of their properties; their reality and the reality of their properties are conferred upon them by virtue of their *derivation* from empirical things, including operations and their consequences. The reality of the qualities of scientific objects has to be established prior to and independently of their attribution to scientific objects. They are attributed to scientific objects because they are real; they are not real because they are declared to be qualities of scientific objects. Dewey remarks that although Newton's neglect of the secondary qualities has been the source of constant philosophic discussion since, no one has stopped to question the scientific validity of his making the primary qualities inherent characters of the atoms or corpuscles. Dewey makes the remark to point his argument that failure to criticize Newton's inclusion of primary qualities, reveals a failure to understand the method of science—that "science by means of its operational conceptions was instituting as its objects of thought things in a dimension different from *any* of the direct *qualities* of objects" (*The Quest for Certainty,* p. 120). But the failure may also be used as evidence of at least tacit admission that the reality of scientific objects is dependent upon their qualities being identical with the experienced qualities of things, that the possibility of science being a knowledge of reality is dependent

upon empirical things being real. The test of reality, that is, is resident in experience. To suppose that the reality of the objects employed by experimental science is established by experience and yet that experience itself is fundamentally deceptive, that is, does not constitute the test and criterion of reality, would be plainly self-contradictory.

Newton does distinguish between qualities which characterize all empirical things we can experiment with, and qualities which characterize only some empirical things. This distinction, it must be emphasized, originates within experience, and applies, in its primary form, to empirical things. The distinction is valid, therefore, only on the ground that the authority of experience is maintained intact. Now a difference disclosed by experience can not, obviously, be used to disqualify experience; for such disqualification would necessarily disqualify the difference disclosed and hence remove the very reason for the disqualification originally made. That some qualities have a restricted range of occurrence and some occur universally is a fact of considerable, even fundamental importance. But it is a fact about the distribution of reals, not a fact about the relative reality of the respective classes of qualities involved. That a given quality has a given range of distribution is established by the experience that discloses that range. The authority of the experience gives reality to the definition of that range. To then reverse the relation, and use the definition of the range as a means for determining the validity of experience involves committing a variant of the fallacy previously noted. What universally occurs is real, but universality can never constitute the test and criterion of reality. For the same reason, the fact that qualities or things have a limited range of occurrence, are less than universal, can never be legitimately used to prejudice their reality.

The distinction between qualities of universal range and qualities of limited range, is a distinction between qualities, not things. Experience does not disclose two classes of things, each class uniquely characterized by qualities of the one class or the other. Empirical things are all of them characterized by qualities of the two classes; in experience, the two classes of qualities are inseparably intermixed. The atom or corpuscle, on the other hand, is admittedly characterized only by qualities of one class or type. The artificial character of the atom or corpuscle is patent. The atom or corpuscle is obtained by arbitrarily segregating all the universal qualities and compounding an "object" out of them. Such a procedure, whatever its necessity for scientific purposes, has no warrant from experience; is, in fact, in flagrant violation of all its deliverances. The fact that the atoms or corpuscles are characterized by only one class of quali-

ties is more important evidence of their hypothetical character than the fact that they have also attributed to them the properties of being imperceptible, indivisible, and permanent.

IV

Leaving to one side the undoubtedly hypothetical character of the atoms or corpuscles, and accepting them, for the moment and for the argument as being realities precisely in the way they figure in Newtonian science, the question we wish to raise is whether or not they can be employed, consistently with the requirements of scientific explanation, to discredit the reality of empirical things, in so far as empirical things possess qualities which are other than the qualities of the atoms or corpuscles. It is clear, of course, that such employment can not be made consistently with the principle of experience. The assumption underlying the Newtonian derivation of the primary qualities is that the qualities of scientific objects must be "like" the qualities of experienced things. (How far he departed from this rule we have seen.) The so-called primary qualities are real qualities because they are experienced qualities of empirical things. But the so-called secondary qualities of empirical things are no less experienced characters than the primary qualities. To deny secondary qualities reality on the ground that they are "unlike" the qualities of scientific objects, involves setting up scientific objects as the norm or criterion of reality; which can be done only by violating the principle of experience from which is derived the reality of the scientific objects themselves.

But we wish to restrict attention to the use of scientific objects in scientific explanation and what such use implies with respect to the reality of empirical things and their qualities.

The explanatory force of scientific objects is clearly dependent upon their being a real relation between scientific objects and empirical things. If empirical things are removed entirely from existence, then the explanatory value of scientific objects—as explaining the world we live in—is also thereby completely dissipated. Of course, no philosophical theory ever *premisses* the unreality of empirical things. Empirical things are always initially given sufficient provisional reality to make the subsequent undermining of their reality assume the form of a presumably significant conclusion. In reaching this denouement, the divergences between scientific objects and empirical things always play a stellar rôle. Science is represented as demanding, necessitating that the drama of human thought terminate in the final catastrophe of denying the reality of those qualities which make the world one of delight and value. We

are urged to immolate, on the altar of Scientific Truth, all in the world that makes it humanly precious, save for the rarified, exalted experience—which, curiously enough, is somehow not to suffer in the universal immolation of human values—of being able to worship as a liberated intelligence, a Free Man, should. Now can Science actually support such a conclusion? Or is Science itself reduced to a state of helplessness and insignificance when empirical things and their secondary qualities are denied reality?

Scientific objects are related to empirical things in two fundamental ways: either as the elements which constitute the empirical things, or as the "productive causes" of which the empirical things are the effects. Under the Newtonian theory, an empirical physical body is, with respect to its primary qualities, literally constituted by the atoms or corpuscles in the same sense in which, say, a pile of bricks is literally made up of the individual bricks. The relation of the scientific objects to empirical things is, in such instances, that of parts to wholes. Reduction of an empirical whole to its parts does not, in this type of instance, prejudice the reality of the whole. "Reality" is not a property that can be sloughed off or put on. If the parts are real, they inevitably transmit or contribute their reality to the whole they constitute. When it is said that a whole is "reduced" to its parts what is meant (with few extreme exceptions we need not consider) is that the whole can be completely conceived of, or described in terms of its parts; that the whole is nothing more than the sum of its parts, and therefore that the relation of the whole to its parts can be expressed mathematically or quantitatively, *without remainder.*

The other fundamental way scientific objects are related to empirical things is that of being the "productive causes" of the latter. The term "productive cause" is not especially happy; but in default of a better term, it will serve the purpose of designating the peculiar type of relation between scientific objects and empirical things examples of which are the relation of air-vibrations to sounds and electro-magnetic vibrations to colors. By no stretch of the imagination can this type of relation be identified with the relation of element to compound, or part to whole. Sounds do not literally contain the air-vibrations, as a physical body, for instance, contains the atoms; nor do colors literally contain the electro-magnetic vibrations. Neither sounds nor colors are, in this sense, composites of parts. Although the relation of the air-vibrations to the sounds, and the electro-magnetic vibrations to the colors is expressed mathematically or quantitatively, it is *not* expressed in this form *without remainder.* The remainder that each mathematical or quantitative expression leaves over is precisely the sound or color for which the mathematical statement is given.

These two types of relation of scientific objects to empirical things are both involved or present in every chemical formula, chemistry being, so to speak, a "mixed mode" of scientific explanation. A molecule of water, for example, is held literally to contain in itself the constituent chemical elements, hydrogen and oxygen. The hydrogen atoms and oxygen atom are literal parts of the molecule of water. But, in becoming parts of the molecule of water, a "chemical change" takes place. Hydrogen and oxygen lose entirely the qualities they have as atoms or elements; in their stead appear the totally dissimilar qualities of water. Now the relation of the chemical elements to water is expressed mathematically or quantitatively (H_2O); again, however, *not without remainder.* The remainder is precisely the qualities which distinguish the molecule of water from its constituent atomic elements, hydrogen and oxygen.

In one sense, of course, these "remainders"—the colors, sounds, and experienced qualities of water—do not enter into the body of scientific knowledge; that is, they do not figure as terms of explanation. But in another sense, these "remainders" play a prominent and indispensable rôle in scientific knowledge: they are what science "explains." The terms of explanation are elements, atoms, electrons, vibrations. But these terms would have no significance as terms of explanation if what they "explained" were denied reality. The fundamental ground upon which all scientific explanation rests is that there is a real connection between the explanation and what is explained, between cause and effect. This connection, furthermore, is not uni-directional, but reciprocal. A real cause determines a real effect, and a real effect implies as its determinant a real cause. Also, real differences in the causal factors must occasion real and corresponding differences in the effect-factors, and vice versa. To impair the connectivity is to reduce scientific explanation to the level of insignificance. When, for instance, science states that X number of electro-magnetic vibrations determine the color "red"; and Y number of vibrations determine the color "yellow," these two statements or explanations are significant only if "red" and "yellow" are realities, really differ from one another, and are really the effects of the vibrations as their "productive causes." If these colors are declared to be unreal, then either the vibrations are unreal, because an unreal effect involves an unreal cause (whatever the latter may mean) or else the stated connection between vibrations and colors is false. To declare the colors not unreal, but real states of "consciousness" and not objective real characters of physical things does not, as far as scientific explanation or scientific research is concerned, alter in the least the asserted connectivity between the vibrations as "productive causes" and the colors as their effects. All it

does at most is to add another link to the causal chain, in that reputedly physical productive causes such as electro-magnetic vibrations would have, on such count, necessary (reputedly) psychical effects. What the physicist is concerned with is not the characterization of color as "psychical" nor even the characterization of vibrations as "physical." As far as the actual content of his science and his procedure are concerned, these two terms could be interchanged, and vibrations called "psychical" and colors called "physical" without any further change than this terminological one being effected in his science. Or they could be both called indifferently by either term or by some term as yet uninvented; or finally by no term at all. As physicist, the metaphysical characterization of colors or vibrations is of no importance whatever; he is interested in the connection between vibrations and colors, in the productive causal relation that can be discovered and established as obtaining. For all scientific work, therefore, the characterization of colors as "psychical" is simply irrelevant and can be ignored, because the characterization in no way affects or disrupts the connection asserted between vibrations and colors. The occurrence of "yellow" in the spectrum—to take another example—would still be evidence of the presence of sodium, for that sodium has a yellow flame is not determined by the characterization of yellow as psychical (or physical), but by observing the visual effect when sodium is ignited.

To characterize "yellow" as "psychical" may be both important and true for metaphysics or psychology. But for chemistry and astro-physics it is at best an added fact which in no way affects the procedure and content of their own proper enquiries and is, as far as they are concerned, strictly irrelevant. The meaning that "yellow" has for these sciences is that there is an established, dependable, unique relation between burning sodium and a "yellow" flame. It is, furthermore, a meaning that is as public, as non-personal, as atoms, electrons, or vibrations. It is as certain and as unambiguous a sign or indication of the presence of sodium as would be the determination of the presence of the latter by such an ultra-scientific "object" as, say, specific gravity. As such a sign, although it is related to the perceiving organism the way, for example, vibrations are not, it is as much a "scientific object," that is, a part of science, as the latter. Yellow will find no place among the terms of "explanation" employed in the science, but it is a "meaning" or fact included within the science and performs a notable scientific function. The science of chemistry could no more function without yellow (and the other colors) than it could function without the Law of Multiple Proportions or Boyle's Law. This is not to assert they are both on the same plane of importance or generality of use;

what is asserted is that they are on the same plane as far as being indispensable for those branches of the science in which they respectively figure. The Law of Multiple Proportions and Boyle's Law are of wide applicability, but neither have value or use in spectrum analysis; whereas without the use of colors as unique and dependable signs, spectrum analysis would be impossible.

That science would be helpless as well as insignificant if the reality of the "remainders" were denied is obvious from the foregoing but perhaps a few more remarks on this point will not be out of place.

All experimentation and observation involve the use of empirical things and their secondary qualities. Scientific apparatus includes such things as chairs, tables, spectra, photographic plates, water, mirrors, measuring and weighing instruments, test-tubes, litmus-paper, mirror-images, wood, metals, etc. The rooms and buildings in which the laboratories are housed are also part of the general apparatus science employs. However far removed the conclusions of scientific investigation may be from the original empirical materials employed in the experiments and observations, the validity of the conclusions is dependent upon the validity of every single factor, step, or process used in reaching the conclusions; for a scientific conclusion is as strong as the weakest link in its chain of evidence.

The deviations in the orbits of the planets Uranus and Neptune suggested to Percy Lowell the possibility that these deviations are caused by a planet as yet undiscovered. By calculations based on the then known laws and facts of astronomy and physics, Lowell determined where this new planet should be. The test of Lowell's idea and calculations is whether or not a planet can be observed in the designated location. The Lowell Observatory claims to have discovered or seen this planet. Did an observer actually look in the sky and actually see the planet moving in the heavens at its appointed spot? "All that any person has seen," writes Whitehead, "is a few faint dots on photographic plates, involving the intervention of photography, excellent telescopes, elaborate apparatus, long exposures, and favorable nights. The new explanation is now involved in the speculative extension of a welter of physical laws, concerning telescopes, light, and photography, laws which merely claim to register observed facts. It is involved in the speculative application of such laws to particular circumstances within the observatories, for which circumstances these laws are not concurrently verified. The result of this maze of speculative extensions is to connect the deviations of Uranus and Neptune with the dots on the photographic plates" (*Adventures of Ideas,* p. 163). The speculative extension of scientific laws is the aspect of scientific ac-

tivity Whitehead naturally emphasizes and the illustration quoted is used by him for this purpose. The interest we have in the illustration is that it indicates that each factor in a scientific experiment must be authentically connected with every other factor, all of the factors finally converge upon the observed datum, and are used in the interpretation of it. Any defect in any of the apparatus employed vitiates the meaning and validity of the final result. The apparatus is subjected to scientific interpretation and control but its actual "thereness" or "isness" is unquestioned by the scientist, in fact is, by him, unquestionable.

As the body of scientific knowledge becomes more extensive and the apparatus more complicated, the possibility of meaning of the observed datum becomes greater. But with this increase in possibility of meaning accrues a corresponding increase in responsibility and power. The fate of the whole elaborate system of scientific calculation, involving the welter of physical laws, depends upon whether or not the few faint dots will be registered on the photographic plates exposed. This power which is potentially resident in every experimentally observed datum was most dramatically and fully realized by the Michelson-Morley experiment. The observations made in this famous experiment were, taken by themselves, trivial, almost insignificant, when compared with the vast and elaborate system of science existing at the time they were made. It is hardly conceivable, for example, that a grand philosophical system would even hesitate in pursuing its majestic journey because such an item happened to cross its path. It would either ignore it in lordly manner or else pooh-pooh it out of the way. Science, however, does and has to accept the "appearance" as being in its own nature, final, ultimate, decisive. The fate of the whole system of science turned upon what "appearance" would emerge in the interferometer. The prevailing system of "scientific objects" had to be discarded and a new system of "scientific objects" invented and introduced to accommodate the "appearance" that did emerge. This was necessary because what "appears" in the common perceptual field of an experiment is not a mere occurrence outside the boundaries of the scientific domain, which can be disposed of as convenience dictates—in "consciousness" or wherever; what "appears" in the field of perception, visual, auditory, or manual, encloses within itself the sum of meanings of all the factors involved in the experiment; it has an evidential, probative force which reaches back into the most recondite recesses of scientific speculation. And, most important of all for the argument at issue, the observed datum must be embodied in the scientific explanation *precisely as it appears.* The careers of the scientific objects, determined by the whole welter

of physical laws regulating their behavior, must culminate in the actual, historical, or temporal occurrence of the specific datum observed, precisely as it was observed. The relation of the scientific objects to the observed datum is expressed in an appropriate "timeless" formula. But the meaning of the relation is temporal in the sense that the operations or behaviors of the scientific objects according to their various laws must eventuate in the particular datum which is observed at a particular historic moment. When "corrections" for probable error are made—which ostensibly modify the characters of the observed datum—these "corrections" are simply supplementary to the laws invoked in the original calculation and have logically the same status and function as the latter. The ultimate authority resides in the experienced "appearance." It is the experienced "appearance" that has the authority to make or unmake the "scientific objects"; whereas the latter have no power to upset or even disturb the former. The ultimate test of all scientific speculation and investigation occurs in the commonly experienced field of empirical things and their qualities.

V

We have seen that neither a consistent use of the principle of experience by means of which the scientific objects are obtained, nor a consistent application of the principles of scientific explanation, observation, and experimentation, can disturb in any way the reality of empirical things and their qualities. Scientific procedure is continuously dependent upon empirical things. They supply the subject-matter to be investigated and function, within the scientific process, as means for carrying on the investigation. There is in science no opposition, statable in terms of difference in reality, between scientific objects and empirical things. Remove empirical things into a pseudo-existential realm, and scientific objects and results follow them there inevitably. There is also no difference in reality between primary and secondary qualities in scientific inquiry. Colors are relied upon as scientific evidence of as indisputable authority as masses in motion. Sound as a real occurrence, is studied with the same objectivity imputed to it as gravitation. The distinctions that are made in science are distinctions in type of function and evidential value, not distinctions in reality. The distinctions, that is, are logical not metaphysical. Whatever science may be used for, it can not be used for the purpose of creating a difference in reality between scientific objects and empirical things to the detriment of the latter, without involving science itself in hopelessly stultifying self-contradictions.

For Newton the burden of proof of reality rested on scientific objects. An experimental philosophy, Newton believed, could defend itself from criticism only if it fashioned its scientific objects on the model of empirical things. But to make scientific objects exactly like empirical things would not, of course, do either; it would be a meaningless duplication affording science no vantage point from which to operate. Some of the qualities of empirical things had to be neglected, no matter how faithful to experience the experimental scientist desired to be. If Newton had constructed scientific objects which had no points of similarity with empirical things, or if he had maintained that despite the likeness of his scientific objects to empirical things, it was not necessary for the purposes of his experimental science that the former be natural existences in the very form they had in his science, that is, that they could be genuinely hypothetical, it is just conceivable that the problem of the relation of scientific objects to empirical things would not have taken on the form it did in the work of Locke. It is conceivable that attention would have been directed to a consideration of the methodological form of modern science.

The fact that Newton believed his atoms or corpuscles were real natural existences precisely as they appeared in scientific discourse, and that such belief was essential for the validity of an experimental science, coupled with the fact that his scientific objects were sufficiently like empirical things to make it seem plausible to consider and compare them on the same plane—these facts undoubtedly helped to precipitate the problem of the relation of scientific objects to empirical things in the form it assumed in Locke. But these facts, though helping such precipitation, are not in themselves sufficient to account for the doctrine arising that the reality of scientific objects challenges the reality of empirical things, since the dependence of science, especially Newtonian science, on empirical things is at every point manifest. When we canvass the arguments that show that scientific objects can not legitimately challenge the reality of empirical things nor even place empirical things beyond the proper boundaries of science, without also having that challenge turn against themselves, and that extrusion reduce science to a state of helplessness and insignificance, the conclusion is forced upon us that such self-nullifying doctrines are imported into modern science and do not grow out of an examination of its nature.

What then is the reason, necessary and sufficient, to explain why scientific objects were (and are) supposed to challenge the reality of empirical things? The reason, as Dewey has pointed out, is the theory of knowledge which Newton, Locke, and their successors inherited from Greek philosophy and uncritically accepted. Ac-

cording to Greek philosophy, knowledge is an immediate and exclusive envisagement or beholding of reality. If we apply this theory of knowledge to the interpretation of modern science, it follows that scientific objects being objects of knowledge are alone real. All other experienced things in so far as they differ from scientific objects are in so far other than real. Precisely what status they have is a mystery, a mystery that can be solved only by an epistemology. The subordination of metaphysics to epistemology in modern philosophy is a natural consequence.

The Greek theory of knowledge, it must be emphasized, was based upon and harmonious with the findings of Greek science. It did not involve Greek science in contradictions, but faithfully and adequately expressed its methodological form. Greek rationality would not admit a theory of knowledge that was inconsistent with their dominant scientific practice; nor, it must be added, would they admit a type of scientific analysis that was inconsistent with their developed theory of knowledge. Democritus's theory of atoms could gain no foothold because acceptance of that theory would throw the then accredited philosophy and science into confusion.

Modern philosophy has been content to follow the letter of Greek philosophy even though it does violence to its spirit. Devotion to the spirit of Greek philosophy would require above all that we base our theory of knowledge upon our scientific practice, harmoniously and adequately expressing its methodological form. Any theory of knowledge that did not make our scientific practice consistent and intelligible would, if we drew our inspiration from the same fount as the Greeks, be *ipso facto* discredited. There is neither philosophical rhyme nor reason in holding on to a theory of knowledge that makes nonsense out of our science, the most extensive and most important body of *knowledge* that we possess.

There is one conclusion of paramount importance that an unprejudiced examination of modern scientific practice yields: it is, that the reality of empirical things must be asserted as the precondition of any consistent interpretation of scientific method. Whatever be the status attributed to scientific objects by our theory it must be a status that will support the reality of empirical things and not undermine it. The reality of empirical things is not, that is, something which a philosophy based on modern science has to establish. Modern science unequivocally establishes that for philosophy. Another way of stating this is that faithfulness to modern scientific practice makes the separation of metaphysics from epistemology mandatory, not a matter that is left to philosophical discretion.

The problem of the relation of scientific objects to empirical

things can be approached from two standpoints: either the differences between scientific objects and empirical things exist antecedently to and independently of scientific investigation, and scientific methods are simply the means necessary for disclosing or discovering them; or these differences are introduced by the methods of scientific research and these methods are consequently responsible for them. Since this paper is a preliminary analytical survey of the problem, it would not be consonant with its character or its form if we were, in the closing lines, to set forth our own positive conclusions. We have indicated above which of the two standpoints we believe is the one that will, when adopted and consistently and thoroughgoingly maintained, prove itself to be fruitful and of solving power. This indication of our position must suffice here; we shall present the positive and constructive results of our analysis later. But we may here provisionally conclude, in view of the foregoing, that whichever alternative is accepted as leading to the solution, the reality of empirical things must be supported by the solution arrived at if it is to be worthy of consideration. Any solution which fails to fulfill this fundamental requirement, no matter how attractive it may be in other respects, stands self-condemned.

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IDEALISM, ESSENCE, AND EXISTENCE

IN recent years, realistic attacks upon the validity of idealism have, in the main, centered upon its epistemology rather than its ontology. From the early diatribes of neo-realism to the courteous polemic of Professor Pratt, "Is Idealism Realism?" [1] the discussion has dwelt with sometimes wearisome reiteration upon the subjective or solipsistic implications of idealism. Since both Professor Barrett and Professor Brightman replied in apparently convincing fashion that the crux of the problem lies elsewhere,[2] and since the recent symposium, *Contemporary Idealism in America,* avoids the argument from the ego-centric predicament, it may be well to inquire whether a different approach is not possible.

The vital center of idealist doctrine today appears to lie in two main contentions, first, that reality is intelligible, second, that mind is self-transcendent, a unique entity differing in kind from what "is taken to be" physical reality.[3] Since the amount of agreement

[1] THIS JOURNAL, Vol. XXX (1933), pp. 169–178.

[2] *Ibid.*, Vol. XXX (1933) pp. 421–429; pp. 429–435.

[3] It is, of course, true that realism must admit intelligibility, but the difference seems to be that while the idealist makes this the starting point for metaphysical reflection, from which various implications are drawn, it is, for

between realists is perhaps larger on the first issue than on the second, it will be more rewarding to focus attention upon it. Since it is impossible to consider all phases of the argument, we can consider here but a specialized feature of the doctrine of intelligibility; it is one to which Professor Hocking has recently given some attention, though the initial impulse came admittedly from Royce. A few quotations will set the problem: "The factuality of things is not their essence: in some way, their being is what they *mean*."[4] "Either, as you see, your real world yonder is through and through a world of ideas, an outer mind that you are more or less comprehending through your experience, or else, in so far as it is real and outer it is unknowable, an inscrutable *x*, an absolute mystery. The dilemma is perfect. There is no third alternative. Either a mind yonder or else the unknowable; that is your choice."[5] And elsewhere, Royce asks a leading question, "Is it any part of the essence of a thing that it exists?"[6] implying, of course, that an affirmative answer is necessary. Following this inference, Professor Hocking draws these significant assertions, "It is the central problem of metaphysics whether reality is such that we can understand it. Those who make a clean break between essence and existence impose a final negative at the outset. . . . The world of existence is a world whose character is ascertained by a process of 'interpretation,' whose whole concern is with essences: that which distinguishes existence from essence, the actual from the merely ideal, turns out to be itself ideal."[7]

The objective idealist thus recognizes with the Platonic realist the distinguishable character of essence and existence. However, the former contends that this difference is one which blends into identity within the concrete reality called the self, that essences are not only coextensive with but form the real being of existence. To the extent that Santayana and other realists eloquently describe what existence is, its brute irrational character, its flux and shock, to precisely that degree does the realm of existence become caught up into essence. The very fact that naturalism gives the space-time realm a character indicates that it belongs rightfully to the realm of meaning. "Es-

the realist, a feature which he accepts with natural piety, hesitating to rest too much ontological superstructure upon it. Realism demands a broader base for its reflections. In Drake's words, "It would seem that the striking thing is not that the world is intelligible, but that we have minds that can, in some measure, understand it" (*Invitation to Philosophy*, p. 439).

[4] W. E. Hocking, *Types of Philosophy*, pp. 271–272.

[5] Josiah Royce, *The Spirit of Modern Philosophy*, p. 364.

[6] Cf. W. E. Hocking's article, "The Ontological Argument in Royce and Others," in *Contemporary Idealism in America*, p. 45. Henceforth we shall refer to this article as OA.

[7] OA, pp. 56–57.

sence, which was to remain on one side of the gulf, appears on both sides!''[8] The real world is thus the intelligible world and that alone.

Let us subject this view to a more careful scrutiny. Returning to the dilemma with which Royce challenges every realistic view of the world, namely, the Unknowable vs. the Absolute Intelligible, it seems clear that realism must refuse to accept either of these alternatives as final. Is it, after all, necessary to repeat the mistakes of Herbert Spencer? True the realist may contend, as the great agnostic did before him (without, perhaps, the pontifical assurance) that the inner core of being is not reducible to rational terms, though description may approach that vanishing point asymptotically. The fact that existence can enter into the relation of intelligibility hardly proves that it is necessary for it to be in that relation. To insist that reality is shut up to two alternatives, one the Sphinx, and the other the all-inclusive Knower, is to strain credulity. If the object of knowledge were totally reducible to idea, it would cease to be an object and become identical with the subject. Since this does not happen in our experience,[9] any appeal to the Absolute for validation is simply denying the known because of the unknown. In Sellars' words, ''Knowledge must be seen to be what it is and must not be taken for what it is not. It makes no claim to be being. . . . It is my opinion that idealists have had more difficulty here because denotation is for them subordinate to connotation.''[10]

In considering Professor Hocking's position, it may be admitted that factuality is an essence, and, consequently, comprehensible as a meaning. But is factuality the same as a fact? Empirically we know that there are clear meanings and opaque ones, a fact which Professor Whitehead often emphasizes. There is no *a priori* reason why an essence may not conceal as well as reveal—as a matter of empirical observation, honesty compels an admission that we find it so. The objective idealist appears to insist that the inscrutability of being is transparent to the final insight accorded the Absolute, that it is the essence of insight to be clear insight. The realist rejects this non-empirical appeal to the Infinite by giving the opposite answer, referring to both Plato and Kant as he does so. Existence, he asserts, is itself opaque and mysterious, transcendent of meaning itself (though it may, from the standpoint of value, hold a place

[8] *Ibid.*, p. 47.

[9] G. W. Cunningham, the most critical of American idealists, insists for his part upon the ''trans-empirical'' factor in knowledge. Cf. *The Idealistic Argument in Recent British and American Philosophy*, p. 360 passim.

[10] *The Philosophy of Physical Realism*, pp. 293, 303.

below it in the scale of being). Parenthetically he indicates that this assertion does not involve complete nominalism, though, of course, it would be compatible with it.

There is naturally sharp divergence among realists in their portrayal of being. Professor Laird calls it a featureless, formless element "correlative to form and as essential to substance as form is."[11] Since it is formless, it is unimaginable but not unthinkable. Professor Sellars calls matter or substance a "continuant" or concrete existent with characteristics which express its concrete nature in such a way that knowledge may have a handle for its operations. He asserts, "It is clear that cognition from its very specialized nature gives but the pattern of the world and not its living content."[12] Whitehead, while rejecting the term "substance," nevertheless characterizes the inner core of being as appetition or creativity, depending on the perspective from which it is viewed. The flux of being for him, as for Santayana, is irreducibly beyond characterization by the essences. Thus in spite of differences, realists are united in their refusal to accept such an illusory clarity as the identity of essence and existence. It is their unanimous contention that being is not fully statable in terms of meaning, and they can point to countless examples where idealism has discarded this issue voluntarily—Schopenhauer, Schelling, Lotze, von Hartmann, Bradley—the list grows long. Only a comparative few have insisted upon the logocentric solution and there might be scant agreement upon these names.

But if idealism is not bound up with the fortunes of the doctrine of intelligibility, why raise the issue at all? The answer is that a further refinement of the argument awaits our attention. Essence and existence, so Royce and now Professor Hocking tell us, are one in a single instance, God or the Absolute Experience. What does this assertion mean? Royce replies as follows, "Aren't you using at the moment something like an ontological argument for supposing *that there is a real world,* and answering the question why there isn't rather nothing at all? You reply that something has to exist . . . you know there is a world *from the nature of the case,* from the very definition of the world."[13] It may be that realism, in unguarded moments, has argued in this fashion. But its usual and most cogent reply would be that so far as we can see, there is no inherent necessity either in the existence of something, or of a world. It may be the best workable assumption so far, but

[11] *Problems of the Self,* p. 348.
[12] *Op. cit.,* p. 285.
[13] OA, p. 53.

I do not, as a realist, need to show that this is *a priori* necessity in order to continue my interpretation of reality. It may be practically impossible for me to doubt the existence, not only of a single item of experience, but a wide variety of things, together with the relevance of propositions to these objects. Yet any statement I make about the totality of existence is provisional since the whole is not a determinate object of discourse. Nor does the nominalist say that the world *must by the nature of the case,* be individual. He simply contends that he finds it so, so far as his experience goes. It is true, his exploration proceeds in part by means of the categories, but for him these are clues rather than literal descriptions. The Platonic realist, on the other hand, can admit the objective nature of the universal within existence without implying (in Hocking's words) "that the entire fabric of the object is derived from the world of essences."[14]

Professor Hocking continues in a striking summary, "If there is any world at all, it must be of this sort,—an element of invariance in our interpretation of the world for which the term category would be appropriate."[15] Now it may be true that all categories or essences are invariant, but the converse is still in doubt: does it follow that all forms of invariance must be of the conceptual type? The possibility still holds that the actual may possess an invariance of its own, which, of course, may be designated by an equally invariant essence. This seems to be Sellars' contention when he postulates the continuant.

Does the realist then make the mistake of asserting that *the world must be such that* an invariant element is present as the core of being? It is more accurate to say that realism holds the conception of the invariance of existence to be a hypothesis and not an axiom. All that the idealist means by his contention that "the world is such that it must" have a certain character, is an expression of what Hocking, describing the realist, calls a dogmatic reliance on "natural intuition." The difference is that the realist prefers to keep this natural intuition in its primal form, while the objective idealist will have none of it unless it parades in the garb of pure reason.[16]

[14] *Ibid.*, p. 57.

[15] *Ibid.*, p. 58.

[16] Professor Hocking goes so far as to contend, "There is nothing in essence, so far as it is apprehended by mind, which does not tend toward existence. It belongs to the essence of the apprehended essences to have a nisus toward existence" (OA, p. 60). Is it possible that the Jabberwocky, Snark, and Boojum, in so far as they are apprehended, tend to become realized? The statement is modified on the next page to read, "Whatever is desirable is possible (I do not say realizable); the existence of desire is itself a highly general union of essence and existence."

The final conclusion to which Hocking seems driven by the ontological argument seems to be that since, in the self, both existence and essence are united (particularly in volition), we must conclude that reality, which admittedly unites both, is therefore an Absolute Self in which self and not-self are reciprocal and mutual elements. It seems to the outsider, however, that what may actually be implied here is a *tertium quid* which unites the two, rather than a self. Hocking himself asserts, "Reality implies an intercourse between self and not-self; it lies, as it were, on both sides of the line between them." [17] In that case why is it necessary to conclude that reality is a Self when mind is admittedly a member of a dual relation? If the answer be that a totally different kind of self is implied, the query follows, why, then, use the word "self" at all?

But this very defense to which idealism is driven indicates that it relegates the union of essence and existence itself to a non-rational or super-rational realm. This is a denial of the fundamental logocentrism with which the whole argument began. Both the fact that Royce places major emphasis upon volition and striving, and that Professor Hocking accepts the mystic way, indicate that objective idealism is troubled by its Apollinian assumptions. For they are assumptions rather than conclusions. Let Professor Hocking defend mysticism in his own words, ". . . the mystic believes, as the agnostic does not, that the quality of the real, though not *describable,* can be *experienced* in a sort of direct knowledge which is far more satisfactory than the remoter knowledge of concepts, just as acquaintance with a person is a *more satisfactory knowledge than the best description.*" [18] If this characteristic is beyond description, is it also beyond essence as a distinct, experienced existent? Knowledge by acquaintance has a higher place than knowledge by description—surely an anomalous result for a writer who insists that "there is nothing in experience which cannot be taken up into essence." [19] Intelligibility thus becomes ineffability. It may be that in order to square its account with initial assumptions, absolutism may find itself driven to posit an irrational Given, along with Professor Brightman. If this happens, objective idealism must face the same question which Brightman has found it necessary to consider: why a Given *within* the self? Is it not more natural to postulate it as outer? The realist insists that if existence as opaque, mysterious, and transcendent of essence is admitted in its own right, the problem may be simplified.

[17] OA, p. 64.
[18] *Types of Philosophy,* p. 395. Italics added for emphasis.
[19] OA, p. 60.

The final question toward which this path has led us is: how is the idealist justified in appealing to the doctrine of intelligibility in any unique sense?

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BOOK REVIEWS

"The Metaphysics of Berkeley" Critically Examined in the Light of Modern Philosophy. GAJANAN WASUDEO KAVEESHWAR. Mandleshwar, Central India: Mrs. Ashavati Kaveeshwar. 1933. Pp. vi + 360. 7s. 6d.

Mr. Kaveeshwar's work is a painstaking analysis and criticism in four books of Berkeley's central doctrines. In the first book, after summarizing the development of modern philosophy from Descartes to Locke, Mr. Kaveeshwar discusses Berkeley's views on the ultimate nature of reality, the true source of knowledge and Locke's doctrine of abstract ideas. The second book is devoted to a critical consideration of Berkeley's immaterialism and the third to an examination of his notion of spiritual substance. The fourth book deals with the exact nature of Berkeley's idealism and his views on space and time. There are also three appendices and an index. Mr. Kaveeshwar's exposition, although frequently repetitious, is clear and sympathetic, and his criticisms are in general cogent and effective. Of especial interest are the footnotes calling attention to certain striking similarities between Berkeley's views and those of the Vidnyanavadin Buddhists. It is to be regretted that more space was not devoted to such parallels between eastern and western thought. The printing, binding, and proof-reading are, as is usual with books published in India, somewhat unsatisfactory.

A. E. M.

L'intuition intellectuelle et le problème de la métaphysique. RÉGIS JOLIVET. Archives de Philosophie, Vol. XI, Cahier II. Paris: Gabriel Beauchesne et ses Fils. 1934. 112 pp. 24 fr.

The writer of this notice has found it very difficult to discover exactly what this study is about. The problem of metaphysics, says M. Jolivet, is to find some facts upon which to base its intellectual structure, and these facts can—according to Kant—be reached only by "une appréhension immédiate et directe, dans sa réalité concrète, de l'être intelligible." This immediate apprehension—

Anschauung in German—becomes *intuition intellectuelle,* and that, suggesting Bergson, also suggests Saint Thomas, Descartes, and a number of others in the history of philosophy. M. Jolivet, falling victim to the suggestion, tries to make a new allignment of philosophers and a reinterpretation of intellectual affiliations. If he were unscrupulous he would conclude that their words' similarity was proof of their ideas' identity. But too honest for that, he candidly distinguishes the variety of their ideas. One would imagine that this would lead him to conclude that their inventors were not talking about the same thing, in spite of verbal resemblances, and that hence they had no intellectual affiliations in this respect. Such a conclusion is not drawn, however, but it is affirmed that all such theories are attempts to escape from nominalism, which may of course be true, even if not for the reasons given by the author.

G. B.

Signification de l'histoire de la pensée scientifique. FEDERIGO ENRIQUES. 1934. 68 pp. 12 fr.

Structure de la pensée et définitions expérimentales. PAUL RENAUD. 1934. 24 pp. 7 fr.

La causalité des théories mathématiques. GEORGES BOULIGAND. 1934. 41 pp. 12 fr.

La notion de liberté et la crise du déterminisme. R. S. LACAPE. 1935. 41 pp. 10 fr.

Exposés de Philosophies des Sciences, publiés sous la diréction de L. De Broglie, I, II, III, IV. (Actualités Scientifiques et Industrielles No. 161, No. 173, No. 184, No. 200, respectively.) Paris: Hermann & Cie.

These four monographs are part of an interesting series, begun in 1929, whose object is to present in convenient form brief statements of the more general recent conclusions or points of view in different sciences. Almost three-score distinct disciplines are included, each represented by editors who are eminent in the field from which contributions are published; the list contains such names as De Broglie for theoretical physics, Cartan for geometry, and Hadamard for mathematical analysis. More than two hundred essays have appeared to date, most of them by French writers but with a fair sprinkling of English, German, and Italian authors who thus appear in French dress. Judging from the list of editors, essays from scientists writing in other than the international languages will ultimately appear in this form. The series clearly fills an important need in this age of specialization, though one would wish that other disciplines besides mathematics, physics, chemistry, and biology were included in its scope. And would also that some

American or English publisher dared to risk such a venture. No comparable series exists in English, though the need for something like it is no less present among English-reading peoples than among French and German ones.

As is to be expected, the contributions are not all of equal value, and with the possible exception of the essay by Enriques the collection under review is a poor lot. Professor Enriques states his views on the value of the history of science for the understanding of scientific as well as philosophic ideas. He sees science not as a body of stable truths, but as a historical process in which human experience becomes widened; science is not something achieved but a process of achievement. That is why, according to him, we must learn the origin and development of ideas before we can see their significance and interrelations. Both positivistic and pragmatistic interpretations of science come in for criticism, while the anti-rational historicism of the last century is shown to have led to an experimental rationalism. Incidentally, Duhem is taken to task for subordinating the rôle of Democritus at the rise of modern science in the interest of the Christian scholastic tradition. There are enough illuminating comments in this booklet, in spite of frequently dubious criticisms, to make it worth reading.

M. Renaud finds it necessary to attribute to the structure of our thought the analogies he finds between the geometrical representations of chemical, optical, and mechanical behavior. He starts out well enough with an interesting analysis of the definition of chemical compounds; but he seems to me to make fairly clear waters muddy by introducing the idea of "cells of knowledge" which are supposed to be helpful toward understanding the practise of the scientist.

It is difficult to discover what it is that M. Bouligand wishes to say. His object seems to be to show that "intuitive" proofs in mathematics, which he claims are preferred by many physicists and mathematicians, are superior in generality to the formal, abstract demonstrations. He argues that in the former the "force" of each hypothesis is made evident by varying them one at a time so that their specific consequences are laid bare. Hypotheses are thus said to acquire "causal" characteristics. However interesting M. Bouligand's illustrative material may be, his thesis seems to me to depend on confusing logical validity with the individual psychology of the mathematician conducting his researches.

M. Lacape wants to be arbiter in the current determinism-indeterminism dispute. Determinism and "freedom" are claimed to be two aspects of the same thing, taken in different temporal sections. There is freedom with respect to the future, for there is really free-

dom of choice in the nature of things among photons and atoms; but with respect to the past there is strict determinism. Concerning the author's remarks about the "transcendental questions" which arise when one asks *why* the world exists it is kinder to say nothing.

E. N.

Die Sendung der Philosophie in unserer Zeit. EMIL UTITZ. Leiden: A. W. Sijthoff's Uitgeversmaatschappij N.V. 1935. ix + 159 pp. 3.30 H.fl.

At the Eighth International Congress of Philosophy in an address on *The Mission of Philosophy* Emil Utitz appealed to his contemporaries to return to the great traditions of philosophy, to pursue the laws of reason in Man, the Church, and the State and to exhibit their eternal agreement with the harmony of the cosmos. Without philosophy, he explained, life is incomplete and without a rich personality philosophy is empty. Just as science must employ experimental apparatus to prove its conclusions, so ethics and metaphysics imbued with personality must be actualized in living men. When this actualization occurs, the author quaintly argues, philosophy is scientific and its conclusions established. This speech, which the present book undertakes to substantiate, is included as a last chapter. The first few chapters entertain us with flash backs of the history of philosophy from Thales to Hegel in the course of which we are made to feel that all the discords and contradictions were as nothing when compared to the persistent love of truth displayed and the unabating sense of the importance of science in human life. The later chapters deal with special problems such as "The Philosopher and the State." Here the author maintains that though philosophy is in essence the defender of church and state, it must be left in freedom if it is to fulfill its office. Radical philosophy which attacks church and state presents no difficulty. Since it violates the essence of philosophy, it is not philosophy and can claim none of its freedom. The book as a whole has considerable interest as a document issuing from the German university at Prague and aiming at a large and popular audience.

V. J. McG.

Karl Marx, l'homme et l'œuvre. De l'hégélianisme au matérialisme historique (1818–1845). AUGUSTE CORNU. Paris: Félix Alcan. 1934. xi + 427 pp.

Karl Marx was almost, but not quite, "born" a Communist. Reckoning from the completion of his doctoral dissertation, in 1841,

when he was 23, there were some three or four years of mature intellectual activity during which he had not yet arrived at a definitely "communist" position. M. Cornu's work, which limits itself to the period up to 1845, is thus mainly a study of Marx, the pre-communist, "*homme et œuvre.*" This part of Marx's career is of special significance, and it is to be regretted that there is not available in English either a comprehensive secondary work, such as the present volume, or the bulk of Marx's own writings during this period.

M. Cornu follows Marx through his school, gymnasium, and university days, then as editor of the *Rheinische Zeitung,* as co-founder of the *Deutsch-Französische Jahrbücher,* as joint author with Engels of *Die Heilige Familie,* and as author of *Thesen über Feuerbach.* So far as he has gone, Cornu has written an intellectual biography, analyzing Marx's work at each of these steps in his career, and thus tracing his evolution to communism and historic materialism. In the earlier portion of the book, the analysis of Marx's writings is projected against the background of political, religious, and economic conditions; in the later part this background is formed of the writings and personalities of such men as Gans, Savigny, Hess, Herwegh, Ruge, Bauer, Stirner, Strauss, Weitling, and others, in addition to the very well-known cases of Hegel and Engels. The latter had attained a communist position on economic grounds before Marx. In those early days, ". . . in matters of political economy, it was Engels who was the master and Marx the disciple" (p. 360). However, Moses Hess, joint author with Marx and Engels of *Die Deutsche Ideologie* (an 1845 production which Cornu's study does not cover), was a communist before either and was in some respects the link between Marx and the French socialists and communists. On this point, Cornu's earlier work, *Moses Hess et la Gauche Hegelienne,* is of special interest.

Although dozens of French thinkers with whom Marx came into personal or intellectual relationship (especially during his Paris sojourn) are considered, one looks in vain for any mention of Auguste Comte. It is almost incredible that the founder of scientific socialism should not have come into contact with, or taken account of, the work of the father of scientific sociology. The neglect of such contacts by historians marks a situation which the disciples of either master have been slow to improve.

Whatever M. Cornu's political or moral views may be, they do not becloud his treatment of his material, a treatment which is at all times careful, clear, and profusely documented. His thesis, i.e., that Marx's evolution to communism was successively through romantic idealism, Hegelianism, left Hegelianism, and Feuerbachian

humanism is not a startling novelty. This fact, however, does not detract from the value of his study.

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OTHER NEW BOOKS AND JOURNALS

Descoqs, Pedro: Prælectiones Theologiæ Naturalis. Cours de Théodicée. Tomus Secundus. De Dei Cognoscibilitate, II. Paris: Gabriel Beauchesne et ses Fils. 1935. 926 pp. 112 fr.

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NOTES AND NEWS

Professor Harry Jellema of Calvin College has been appointed Associate Professor of Philosophy in Indiana University to fill the vacancy created by the resignation of Professor David R. Major.

Professor Eugen Rosenstock-Hüssy, who was for some years Professor of Sociology and the History of Law at the University of Breslau, and has recently served as Kuno Francke Professor of German Art and Culture at Harvard University, has been elected Professor of Social Philosophy at Dartmouth College. He will begin his work in September.

Gail Kennedy, Assistant Professor of Philosophy at Amhert College, has accepted an appointment to teach philosophy at Bennington College, Bennington, Vermont.

Professor William Savery of the University of Washington will be Visiting Professor of Philosophy at Columbia University for the first semester of the academic year, 1935–1936.

Professor John H. Randall, Jr., and Professor Irwin Edman have been promoted to full professorships at Columbia University.